

INTERSPACE

THE EUROPEAN SATELLITE & SPACE NEWS

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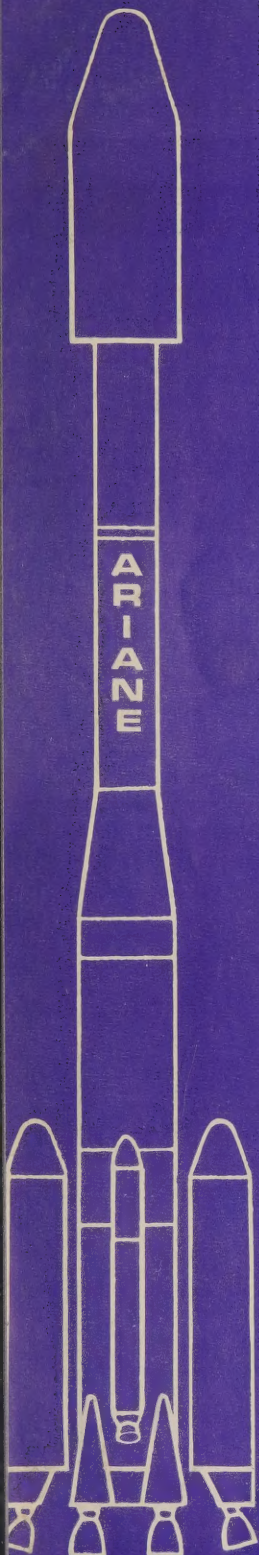
NEWS & ANALYSIS

JANUARY, A CRITICAL MONTH FOR EUROPE

★ As we close for press, the ESA Council of Ministers meeting is underway. We will be covering this in full in the next issue of INTERSPACE, although it is already clear that the outcome will not be a series of cut and dry decisions. Germany has decided not to back the Hermes project and at least one leading German aerospace contact told us this week that the decision to back Ariane 5 Poudre was based on exclusively political considerations. UK is "committed" to the Columbus project but UK Minister Geoffrey Pattie admits that the country has no clout on launch vehicles. We have this week also been advised that the UK is already actively discussing HOTOL with at least one major US company. The Ministers meeting is critical to the future of the European Space Agency. Nevertheless, the crunch may not come until expenditure on the project proposals begins to bite. Also high on the agenda is the problem of access to US technology and technology transfer, and European independence from the USA.

January also sees other major developments in the application of satellite technology. Coronet of Luxembourg faces major problems

in its relationship with the Luxembourg government, although failure at Coronet will not be the end of private or semi-private European satcom ventures. Coronet has said that it may move to another European country, and one potential UK satellite operator has "expressed a desire" to take up the Coronet role if Coronet fails. Nevertheless, France has moved into a very strong tactical position for both supplying transponder capacity for TV distribution and providing demand for same. Mitterand's decision in favour of allowing local and regional TV stations has already been exploited in favour of European TV stations. Country is already considering satellite requirements for its adventurous and comprehensive broadcasting policy. On the other hand, sources close to the TDF-1 project have expressed doubts that a July 1986 launch date can be met. Eutelsat's decision to allocate Eutelsat capacity to Luxembourg will allow early start for the RTL Plus channel backed by Bertelsmann. West Germany has, however, failed to reach agreement on a Federal Policy for new media and this may affect ARD's involvement in the NOS Olympus European TV channel. ARD is the heavy-weight behind Olympus.



SOVIETS ABANDON MOBILE COMSAT SYSTEM

★ The Soviet Union has abandoned its Volna domestic maritime satellite communications system. According to Inmarsat's journal *Ocean Voire*, October 1984, the Volna system "consists of a package on board the new Statsionar geostationary satellites, of which four or five are already in position; the package (which) provides eight telephone channels, was requested by the (Soviet) maritime telecommunications (industry) in pre-Inmarsat days." The Soviet Union, through its Morsviazspudnik administration has a 13.8% shareholding in Inmarsat and uses the Marisat, Marecs and Intelsat V-MCS spacecraft to establish maritime links.

"Volna's frequencies are within the maritime L-band range and close to those used by Inmarsat,

so that the same ship earth station and coast earth station could operate in either system..... The USSR built Volna 5 ship earth stations, now be commissioned for use in the Inmarsat system, was originally designed for use with the Volna system, for which a special coast earth station had been planned near Moscow....."

According to Morsviazspudnik's satellite system manager Pchelyakov, the Soviet Union is planning to install some 80-100 Volna 5 systems a year, reaching a total of 700 ships so equipped by 1990. "Promotion of the (Inmarsat) service is not such a big problem in the USSR as it is in other countries. In view of the fact that Morsviazspudnik is in direct contact with all 17 Soviet shipping companies and ship earth station installation is organized on a planning basis. Extensive advertising will be taken in maritime journals, however, and aimed at seamen directly in order to develop increased usage."

BULGARIA STUDYING USE OF 10-30 GHz FREQUENCY RANGE FOR GSO SERVICES

★ Bulgarian Institute of Communications is considering manufacture of equipment for use in the 10-30 GHz frequency range, studying conditions for broadcasting in 10-30 GHz frequencies and researching use of the **geostationary orbit** for communications and DBS operations

A measuring unit (transmitter-receiver) for 19 GHz frequency has been produced and employed for measurements at the international test Dubna-O terminal in the USSR; similar equipment was developed and tested for 30 GHz transmissions and measurements. Country is planning to undertake research over the next few years on the distribution of electromagnetic waves. Results obtained during 1983 provided abundant information concerning the determination of the diurnal fluctuations of the signal in the atmosphere as well as the effect on rainfall and other hydrometeors. Results of the research are processed in East Germany.

Research has been conducted into signal stability at 12 GHz by using Lutch-2 satellites, a receiver with a low-noise entry amplifier and with quickly orientable antenna. Hungary is contributing to these tests in the 10-30 GHz frequency range with a single-band experimental receiver station.

Both Bulgaria and Hungary are currently able to pick up high quality 11 GHz signals from the Spotbeam East repeater used by West Germany on Eutelsat I-F1 for the 3-Sat TV channel.

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EUTELSAT OFFERS 22 TRANSPONDERS FOR TV

★ Twelve European states and the European Broadcasting Union will now be able to use the Eutelsat system for distribution of domestic and international TV channels. During the Eutelsat Council meeting on 21st to 25th January, Eutelsat members made the following decisions:

a) Approved annual budget of Eutelsat which for 1985 will be around \$30 million

b) Gave go-ahead for the RFP for the interim generation Eutelsat-II spacecraft; three satellites will each carry 16 Ku-band transponders. Power of each transponder has not been finalized although 30W appears likely. Order for satellites will be placed early in 1985 although prime contractor will be known by the end of this year. RFP is to be issued to US companies. Launch of first satellite is due in 1989.

c) Main work of the January Eutelsat Council meeting was the allocation of the leased transponders on Eutelsat I-F3 due for launch in August. By the end of 1985 the Eutelsat system will be able to offer 22 transponders for TV distribution. Eutelsat PR man Philippe Binet "Eutelsat appears to be the first satellite TV distributor in the world for international coverage."

Eutelsat are now offering capacity as follows:

EUTELSAT I-F1 — launched 16th June 1983, operational since 19th October 1983, located at 13° East. Ten Ku-band transponders, allocated by country:—

Country	Transponders
GERMANY	2, 1 SW, 1 SE, P
U.K.	2, SW, P
FRANCE	1, SW, P
SWITZERLAND	1, SW, P
NETHERLANDS	1, SW, P
BELGIUM	1, SW, P
ITALY	1, SW, P/PR
LUXEMBOURG	1, SE, P/PR

P = Preemptible, NP = Non.Preemptible, PR = Provisional, SW = Spot West, SE = Spot East.

Note: Luxembourg will use transponder No. 8 from the 1st April on a temporary basis. This channel is available for the RTL Plus Channel. When Eutelsat I-F3 becomes available at the end of 1985, Italy will leave its Eutelsat I-F1 transponder to use two transponders on Eutelsat I-F3 and Luxembourg will use the available Italian transponder.

EUTELSAT I-F3 — launched 4th August 1984, operational since 12th October and positioned

finally at 7° East. Three Ku-band transponders used for TV distribution, one for SMS services, one for occasional transmissions and four for telephony, data links etc. Allocation for TV distribution as follows:—

Country	Transponders
NORWAY	1, SW, P
EBU	2, Eurobeam, NP

EUTELSAT I-F3 — launch due August 1985, operational October 1985, located at 10° East. Nine transponders available for TV distribution.

Country	Transponders
TURKEY	1, SE, NP
SPAIN	1, SA, NP
U.K.	2, SW, NP
ITALY	2, SW, P
DENMARK	1, SW, P
SWEDEN	1, SW, P
NORWAY	1, SW, P

SA = Spot Atlantic.

TELECOM 1A — launched 4th August 1984, operational October 1984, positioned at 8° West. One Ku-band transponder leased by Eutelsat for European TV coverage.

Eutelsat Council meeting did not discuss the future of the ECS-4 and ECS-5 spacecraft, although ECS-4 may be required in 1988.

SPACE-TECHNOLOGY AND OPPORTUNITIES CONFERENCE

★ Space-Technology and Opportunities Conference, set for 28th - 30th May in Geneva has been timed to review the implications of the ESA Council of Ministers meeting held this week and immediately pre-dates the Paris Air Show. Conference is aimed at all sectors currently involved in space and satellite activities. Organization by Online Conferences, there will be two streams, covering Technologies for Space (notably the space station and space transportation systems) and Opportunities from Space. Speakers have yet to be announced although plenary session is expected to be addressed by ESA's Director General, Reimar Lust and Hubert Curien, French R & D Minister. Other speakers expected include Alan Bond on a fully reusable launcher for Europe, West German views on STS's, Jim Barrett, Delbert Smith and Brian Stockwell on insurance and Pat Norris (Logica) on robots in space. Further details of this interesting and useful conference are available from Monica Cross, Online Conferences, Pinner Green House, Ash Hill Drive, Pinner, Middlesex, HA5 2AE, U.K. Telephone 01-868 4466, Telex 923498 ONLINE G.

BRITISH NATIONAL SPACE CENTRE ANNOUNCED

★ British government has announced limited details of its "high-level directorate" to run British Space policy. To be called the British National Space Centre and likely to be located at the Royal Aircraft Establishment, Farnborough, no details have yet been released about staffing and funding requirements or the date of commencement of operation. Administrative details of BNSC have yet to be finalized. A head of the organization has yet to be announced.

Unofficial sources have advised INTERSPACE that the Royal Aircraft Establishment is already in the process of recruitment of up to 50 staff, despite cut-backs in the aviation side of its activities. Recruitment covers staff with experience in procurement and handling of contracts. Other sources advise that funding for the Centre has directly come from cut-backs in other areas of government expenditure. Other site considered for the Centre is the Rutherford-Appleton Laboratory at Chilton.

Minister of State for Industry and Information Technology, Geoffrey Pattie has said:—

"In establishing the BNSC we have recognised the need for a longer term space policy and one which accepts that the dividing line between basic science and applications can often be rather arbitrary. Hitherto the responsibility for space has been scattered around Government departments, academic institutions and industry and there is clearly a need for a much sharper focus for Britain's space effort. It was also obvious to us that the range of applications would be likely to multiply especially in the field of earth observation and remote sensing."

BRITISH SPACE POLICY

★ Speaking at the British Space Professional's Dinner on the 29th January, Member of Parliament Spencer Batiste (Joint Secretary of the All-Party Parliamentary Committee on Space) admitted that interest in space in the House of Commons was limited to a handful of "enthusiasts" and MPs whose constituencies included major aerospace companies. He believed that the UK needed a coherent space policy and had traditionally followed a path of responding to ad hoc events. Although space matters are not currently a party political issue, the hard judgements on expenditure were still to come. Current need to formulate UK policy is influenced by four problems . 1.)

Structural — too many Departmental frontiers are being overlapped in decision taking and budgetary matter. 2.) Space requires a long gestation period — being dependent on government finance it sits on "dangerous and shifting sands " 3.) Space is seen to be in competition with other new technologies and immediate or short-term returns are given preference. 4.) Lack of public interest in space.

He pointed out the the **minimum requirement** of the newly announced British National Space Centre will be for it to act as a multi-departmental directorate. It will need close links with the Alvey Directorate. "Grave reservations" about long-term US intentions on technology transfer were expressed. The US "is going to the brink" in applying legislation outside its own territory and the recent UK-Chinese agreement over space technology is likely to face problems over technology transfer.

Batiste placed strong emphasis on the need for the UK space industry to get its lobbying act together, quoting the effectiveness of the recent trade union lobbying on behalf of the space sector organized by Chris Darke of AUEW-TASS. Similarly public awareness and interest in space, currently non-existent, were a necessary prerequisite for effective governmental action. The BAe/ESA Halley's Comet probe, Giotto, is likely to have a significant impact on public interest.

Talk by Batiste raised a lively debate amongst members and guests attending the Dinner. Concern was expressed over Ariane 5 Poudre (a now common event in Europe) with at least one notable space expert claiming that the future of ESA was in jeopardy; ESA is now at a cross-roads, having largely completed its original objectives. French and German dissatisfaction with the organization meant that the primary issue being faced by this week's Council of Ministers meeting will be the future existence of the Agency. ESA is having to go to extremes to meet national objectives. It was suggested by one expert close to ESA that the organization was having to fight hard against its own better judgement on space transportation systems to meet these national objectives. The pro-French position taken by ESA reflects the fact that France is providing the funds. Nor was it likely that the UK could have any real clout in the outfit. BAe's Larry Blonstein pointed out that the UK could not increase its space expenditure to the levels sought by some more wishful thinking protagonists. The UK space industry cannot obtain sufficient qualified engineers to significantly increase its output.

Corridor talk following Batiste's speech suggested that what space policy Britain had was, in principle, mis-directed — limiting itself to an R & D Policy and ignoring the need to apply technology already developed or in hand, notably the comsat and ground equipment sectors. An "Open Skies" policy was widely proposed as well as a much more thorough and appropriate broadcasting policy to facilitate new satellite TV services.

CORONET RIVALRY BETWEEN U.S. AND EUROPEAN INFLUENCES

★ January has proved to be a critical month for the future of the GDL satellite system. The Luxembourg government decided to form the company responsible for development and operation of the GDL system. However, the Luxembourg government's requirements have resulted in a conflict between them and the American staff of Coronet. We reported on this problem in issue 58 of INTERSPACE. The position in each camp as we close for press for this issue is:—

1) The Coronet Planning Company is working to establish the Coronet Finance Group. This will have significant American involvement; Clay Whitehead will participate significantly in the management and share in the profits of the venture. The Luxembourg government has not accepted this but would like to keep Whitehead as a consultant for the project.

However the US dominated team has already obtained firmed financial contracts from HBO (5%), Beijer, (10% and "exclusive rights" to broadcast over Scandinavian countries) and from the Hersant French-Swiss investor. It has been discussing procurement of a surplus US comsat and establishment of facilities in Luxembourg.

Whitehead has left Luxembourg following problems with the government and is now working on the National Exchange project and the procurement of the "surplus" satellite.

2) The Luxembourg government favours the formation of a strongly European company to be called Societe Europeene des Satellites (SES) which will eventually replace SLS (Societe Luxembourgeoise des Satellites) formed in May 1984. Whitehead has already invested in SLS which is largely financed from semi-public sources.

Luxembourg government requirements necessi-

tate that Societe Europeene des Satellites (SES) must take form early in February. Potential investors are the National Credit and Investment Company (SNCI) and the State Savings Bank (which is headed by SLS President Corneille Bruck) — these two finance institutions will provide 20% of the funding and have effective control — Fagersta (Swedish manufacturing outfit specializing in car telephones) and RITA of France. However, negotiations with non-Luxembourg investors have not advanced as far as contracts already signed by Coronet. SES has not been involved in negotiations to acquire a surplus US satellite. SES will be headed by a Luxembourg citizen but is looking for "notable" Europeans. Our correspondent has suggested that these include ex LUXSAT man, Paul Hienerscheid (currently with USSBC in the Sates — he recently denied any involvement in Coronet-GDL) and Rene Collette, ESA Director for Communications Satellites.

The Luxembourg government has given four reasons for "abandoning" Coronet and its American staff in favour of the European dominated SES.

a) Slow progress and unfavourable arrangements involved in obtaining investors in the Coronet operating company. After 10 months of effort it is claimed that Whitehead has "only" succeeded in signing up HBO, Beijer and the French-Swiss group. To obtain these investors, Whitehead had to offer inducements such as exclusive broadcasting rights without the agreement of the Luxembourg government. SLS and the Luxembourg government did not appreciate such deals.

b) Conditions requested by Clay Whitehead for management influence and financial participation in the operating Coronet company. Whitehead's proposals for involvement were found by Jacques Santer (Luxembourg Prime Minister) to be excessive. The presence of Whitehead in Coronet marketing and promotion of GDL was not highly appreciated by some European investors, especially those under pressure from their respective national PTT administrations.

c) The requirement of Luxembourg to have a wholly European management team for SES, independent of US influence.

d) New climate favouring contacts between CLT/RTL and GDL. Negotiations between CLT and TDF over use of TDF-1/2 remain problematical, following Mitterand's decision to allow the development of local and regional TV in France. RTL is very interested in providing programming for these channels which will compete with the TDF-1 DBS TV channels and may require a low power FSS system for programming distribution.

MITSUBISHI AND WOLD ANNOUNCE AGREEMENT TO DEVELOP NEW TELECOMMUNICATIONS BUSINESS

★ Mitsubishi Corporation, the largest of Japan's general trading companies, and Wold Communications Inc., US reseller of domestic satellite communications capacity have announced an agreement to jointly pursue new telecommunications business opportunities in both Japan and the United States.

The first project to be undertaken by the companies will be to market transpacific telecommunications business between Tokyo and Los Angeles. Intelsat satellite channels, through Comsat and KDD, will be used in the beginning phase to offer potential U.S./Japan customers various application menus.

The companies will also explore opportunities for domestic telecommunications business within Japan, where private enterprises will be allowed to participate starting in the spring of 1985, as well as connectability to the transpacific service to the U.S. telecommunications market.

Wold Communications is generally regarded as

the leading reseller of domestic satellite communications capacity in the United States and is an FCC-certified common carrier. Wold also provides a full-time satellite television service in the U.S. to the Japanese International Satellite Organization (JISO) in a joint venture with London-based Visnews Ltd.

Mitsubishi Corporation is the leading SOGO-SHOSHA (international trading and business development companies unique in Japan) and has an aggressive record in the telecommunications and media fields. Activities include a new common carrier business with several major partners in Japan; joint ventures with leading American and Japanese companies; a TV conference pilot experiment on the Japanese Communications Satellite No. 2, promoted by Ministry of Post and Telecommunications of Japan; and other ventures.

Both companies are encouraging several potential partners to join the project.

NOS OBTAINS EURO-TV TRANSPONDER

★ Following permission from the Dutch government to bid for Dieter Minning's Euro-TV transponder on Eutelsat I-F2, NOS has succeeded in obtaining it and plans to start its Olympus European TV channel on April 1st. It has been planned to start this channel by leasing high power DBS capacity on the Olympus 1 experimental satellite. Rapid growth of pan-European satellite TV ventures forced NOS to enter the market as quickly as possible. NOS has Dfl17 million in funding from the Dutch government and backing from ARD (Germany), RAI (Italy) and RET (Eire) and further backing from Spain and Greece is expected.

NOS has proposed to the European Parliament and member countries that the Olympus channel should have a "must carry" status for cable networks throughout Europe. It will be available to cable networks free of charge and will be supported by advertising. Must carry obligation will face Sky Channel and TVS with considerable competition.

NOS's success in obtaining the transponder leaves a number of organizations out in the cold. According to our sources, NOS is willing to share the

transponder with other broadcasters but not Dieter Minning's Euro-TV. It had been considered that if NOS were to obtain the channel, Euro-TV could use the channel until Olympus began transmissions. However start of transmissions for Olympus have been brought forward from October to April. Bertessmann had been pushing RTL to obtain the Euro-TV transponder to begin early transmissions of the RTL Plus German language channel. However Luxembourg has requested allocation of a Eutelsat transponder which could be used for the RTL Plus channel. Like NOS, Bertessmann is concerned about competition from satellite TV channels, in its own case SAT 1 began transmissions on 1st January and claims a target of a million viewers by the end of 1985. Dutch broadcaster ATN still has no satellite capacity after being beaten by NOS for the Eutelsat transponder. Dieter Minning did not want ATN to obtain access to the transponder and ATN dropped out of the running.

Dieter Minning's current position remains unclear. He has claimed that he has a major US-Dutch company backing him as well as a consortium of European and American companies. Euro-TV backers, Sporthuis Centrum, are believed to be interested in investing in the Coronet project.

TOWARDS AN INTERNATIONAL NAVIGATION SATELLITE SYSTEM

★ Last week we described NAVSAT, being studied by ESA as a potential world-wide navigation satellite system under international civil management.

Navigation fixes by NAVSAT receivers are achieved by Doppler (medium accuracy) or range (high accuracy) measurements of the signals from up to 6 satellites in view at any one time.

A total of 24 satellites evenly distributed in three 12 hour orbits at 55° inclination provide global coverage through a network of TDMA ground stations under the overall control of a coordination centre.

Continuing ESA studies in 1985 are concentrating on studies of the market for navigation services and further system design definition

GEOSTAR is the name given to a radically different way of achieving an operational civil satellite navigation system. The GEOSTAR Corporation, founded by Princeton's Professor Gerard O'Neill, is a private US company, established to provide both navigation and communications services commercially without any subsidy or development funding from government.

O'Neill's concept is based on users having simple transceivers which both receive signals from and send signals to two satellites in geostationary orbit. Two-way message and precise radiolocation capability is provided through a proprietary combination of existing technologies which link all user transceivers in the system to a single computerized ground station which can in turn provide onward connection to the public telephone and data networks.

Basic radiolocation is achieved by ranging from the ground station to the user transceiver via the two satellites and back again. The round trip delay times are measured by the central ground station computer and reduced to a position measurement in three dimensional space. This is then sent to the user terminal for display.

This digital data link capability can also be used to transfer simple messages between the alphanumeric keyboard and display of the user terminal and the central computer.

A major feature of the GEOSAT concept is the small size and low cost of the user equipment. It is claimed that a calculator-sized, hand-held trans-

ceiver, powered by small torch batteries, can receive from and transmit directly to the satellites in geostationary orbit. This is achieved by a combination of narrow spot beams on the satellites and the use of short bursts of high power digital signals. Preliminary transceiver costing studies show that the user terminals could sell for as little as \$450.

GEOSTAR's business plan show land transportation as a major market and source of revenue. In addition, it is hoped that the relatively small aviation community will make use of the system, thus achieving some of the objectives of the international AEROSAT programme of the late 70's which was not backed by US authorities past the study stage.

Although GEOSTAR Corp. was only set up in early 1983, by August of the same year RCA Astro-Electronics had completed a Preliminary Design Study of the GEOSTAR satellite system. This study included conceptual satellite bus and payload designs, communications link and traffic capacity analysis and estimates of the positioning accuracy for system users.

The proposed satellite is not large by present day standards. It is configured to be launched by a Delta/PAM, as a half payload of an Ariane 3 or by STS/PAM. With 6 for 5 redundancy in key payload units, the satellite dry mass is 525Kg and the station keeping fuel load is 45Kg.

As a baseline, propulsion is provided for east-west station keeping only, as the drift without north-south station keeping can be held to about 0.4 degrees per year by other means.

The mobile users' wide-beam transceivers are entirely unaffected by such a drift and a tracking antenna at the Control Centre allows the maximum fuel loading of 45Kg to last 10 years.

The satellite proposed by RCA is three-axis stabilized using a momentum bias system and the payload antenna is a 30ft diameter dish based on the ATS-6 rib-wrap reflector developed in the 60's.

With an end-of-life solar array power of 2.2KW, a baseline 20 beam configuration for the continental United States (CONUS) is capable of relaying 60 million 32 character messages per hour at a cost per message comparable with the cost of a local telephone call.

The precision in navigation is expected to be

between 2 and 7 meters depending on geometrical factors, although accuracies of down to 1 meter have been achieved in field trials where electronics on mountain peaks has been used to emulate the functions of the GEOSTAR satellites. This high accuracy can also lead to directional guidance data being provided when the system is used to make multiple location fixes.

A number of refinements to the baseline design and capabilities have been studied, including the extension of the basic GEOSTAR system from its CONUS coverage to a hemispherical one. This would be of particular interest to aviation and maritime users.

Several improvements have been identified which could be implemented gradually subsequent to the commissioning of an initial system since the satellite transponders are essentially transparent to the user signal structure.

O'Neill's confident expectations of being able to move straight into a commercial navigation satellite system without a government funded demonstration mission is well based technically — the proposed satellites use components from several existing programmes — but his stumbling block is very likely to be the uncertainty in the market for GEOSTAR services which will lead in turn to a shortage of investment capital under acceptable conditions.

Nevertheless, GEOSTAR has moved ahead with applications to the Federal Communications Commission for frequency allocations and construction permits supported by many airline and general aviation pilots as well as companies in the land transportation and oil industries. Support has also been forthcoming from several US government agencies that would like to use GEOSTAR services at the rates currently being quoted.

What then of the future for GEOSTAR? O'Neill has taken out a broad, strong patent on the system which has been approved in the US and several other countries. The politics of space mitigate against GEOSTAR becoming a truly world-wide system unless O'Neill can tie up with a number of partners in major foreign countries. Even then the problems of differing national attitudes and (de) regulatory procedures would appear to be insurmountable in the short term.

The entrepreneurial nature and critical design features may be applauded but the international civil agency route looks more likely. If that comes to pass as a result of European or other efforts,

then maybe a company called GEOSTAR will be in a prime position to pick up an internationally tendered contract based on its operational experience in the continental United States.

INTELSAT CLAIMS SATELLITES CHEAPER THAN FIBER OPTICS

★ Intelsat Director of Business Planning John Crispin presented a highly pro-satellite paper to the 7th Annual Conference of the Pacific Telecoms Council on 16th January in which he argued that capacity provided by satellite is cheaper than equal capacity provided by fiber optic cables. Paper also argued that satellites have two other major cost advantages over cable in that satellite services are distance insensitive and able to provide extensive connectivity through a single facility. Results of paper contradict "generally accepted beliefs" that fiber optic cables are cheaper than satellites on a per circuit point-to-point basis.

Crispin argues that most of the results publicized so far show fiber optic cables to be less expensive by comparing cost per circuit of a single completely full fiber optic cable facility with the tariff rate for an Intelsat voice circuit. These mean that the capital and operating costs of a single, advanced technology, 100% full fiber optic cable facility is being compared with a tariff rate that embodies a mix of satellite facilities. The latter ranges from a relatively low capacity Intelsat IV spacecraft to plant under construction for the state-of-the-art Intelsat VI spacecraft. The Intelsat tariff rate also represents less than full utilization of the satellites in operation.

Crispin proceeds to compare the TAT-8 fiber optic cable (due to become operational in 1988) with a comparably equipped fully loaded Intelsat VI spacecraft. Comparison also splits Intelsat VI spacecraft configuration into 1) an operational configuration designed to operate in a multiple access mode capable of interconnecting several hundred geographical locations and 2) a maximum capacity utilization mode of operation utilizing a single carrier for each transponder and designed to interconnect relatively few locations.

Comparative analysis yields the following results:

- 1) The capacity of an Intelsat VI spacecraft is 1.6 (operational configuration) to 3.6 (maximum capacity configuration) times greater than TAT-8
- 2) The annualized cost of the Intelsat VI (including earth stations) is 12% higher than the TAT-8 cable system.

3) Therefore, assuming 100% fill of both facilities, the annual costs per circuit are:

INTELSAT VI		TAT-8
<i>Operational configuration</i>	<i>Maximum capacity</i>	
\$1133/Circuit	\$504/Circuit	\$1596/Circuit

For a Trans-Pacific fiber optic equivalent of TAT-8, stretching from the USA to Japan, and therefore considerably longer than TAT-8, cost per circuit rises to \$2,237.

On the issue of Connectivity, Crispin argues that a fiber optic cable is essentially a direct point-to-point facility. The technology has developed to allow limited branching from offshore points. The cost of a separate branch is very high and branching is only cost effective in connecting very large traffic streams to the main cable system. The trend in the development of fiber optic technology is toward greater increases in maximum capacity for a single facility. This suggests that the technology is far ahead of the needed demand for circuit capacity between terminal points. In order to utilize fiber optic submarine cable facilities efficiently, either extensive terrestrial or satellite networks are needed in conjunction with the cables to carry traffic beyond the terminal points of the cable. A distinct advantage of satellite technology is the extensive connectivity available through a single facility. One satellite is capable of serving directly a large number of points located within the beam coverage of the satellite. For example, INTELSAT's Atlantic Ocean Region currently accommodates 448 independent traffic paths covering North America, South America, Europe, Africa and the Middle East. New paths are created simply by adding additional earth stations to access the satellite. Satellite technology is such that the cost of providing service is essentially distance insensitive within the beam coverage of the satellite. This means that it costs no more to deliver the signal directly to the user than it does to downlink through a coastal earth station, which then requires the use of additional terrestrial facilities to deliver the signal ultimately to the user. A key point to stress is that state-of-the-art satellites and cables both have capacities far in excess of projected point-to-point requirements to most locations; therefore, the cost effective use of transmission facilities will depend critically on connectivity capability. This suggests that "economies of scope" as well as "economies of scale" should be considered in evaluating satellites and cables.

CORONET TO PROCURE IN EUROPE

★ Coronet is considering procuring a surplus US satellite to enable commencement of operations in 1986, when lease contracts for the Eutelsat I-F1 transponders expire and to put itself in a position to meet capacity demands for new French regional and local TV and West Germany's and France's newly opened cable networks. However this plan only envisages procurement of one US spacecraft as an interim solution; Coronet will then procure from Europe. Uplink station and the TT&C facility will be purchased in Europe — Bell Telephone of Belgium is particularly keen to supply Coronet with TT&C equipment.

Clay Whitehead is reported to have expressed surprise that the Luxembourg government was considering a new company to compete with Coronet's plans (see Issue 58 of INTERSPACE). At least on paper, Coronet appears to be in a strong position to establish its satellite system. Despite denials, it appears almost certain that Robert Hersant is looking to Coronet for satellite capacity for his TVE channel and possibly for his European News Channel. Sporthuis Centrum is reported to be interested in investing in Coronet. Their Euro-TV channel has now lost its capacity on the Dutch Eutelsat transponder. One of Spain's largest publishers was reported in mid January to be likely to announce a major investment in Coronet. Early in January it was reported that "up to six investment companies are negotiating to put money in the Coronet venture" although the same source reported that the Luxembourg government had asked the Coronet promoters to obtain a widely expanded European financial support "in order to form a real European broadcasting company."

French TVE/Teleurop proposal has not mentioned how it will be broadcast over France and Europe and has been elusive over possible European and US partners. Coronet's PR man, Mario Hirsch, told INTERSPACE that "We have current contacts with the Robert Hersant group, but this group has not decided to invest money in the development of Coronet" but denied any involvement of Coronet in the TVE/Teleurop project. Yet Coronet has announced that a Franco-Swiss investment group involved in publishing has decided to take a 10% interest in Coronet. Coronet has refused to name the investor. Virtually the whole of the informed European press has scoffed at Coronet's denial of Hersant's involvement in the 10% stake, although the precise nature of the link is not clear. On the other hand, Coronet's problems with the Luxembourg government may be a significant factor in trying to maintain a low profile in dealing with Coronet.

TURMOIL FROM FRENCH BROADCASTING POLICY

★ Following Mitterand's announcement of his decision to allow the development of private and regional TV channels under conditions of "controlled freedom", France now becomes the bastion of liberalized broadcasting in Europe and has upset the slowly changing European broadcasting scene. Its opportunities in new broadcasting now covers DBS TV, cable, national and regional terrestrial TV as well as involvement in Luxembourg's broadcasting policy and the Eutelsat system for TV distribution. European satellite industry now expects moves by France to provide its own satellite system to provide the transmission capacity for the new opportunities. A large domestic demand for capacity will provide France with a highly competitive edge to push newcomers such as Coronet out of the market for FSS systems to the benefit of the French aerospace industry.

France's almost brilliant strategic move contrasts strongly with the position in Germany, where constitutional arrangements have, so far, prevented a nation policy towards new broadcasting media, and the UK which is bogged down with the desire to sustain a broadcasting duopoly and an obsession with profitability. The UK has also given away an orbital slot at 31°W (see Issue 58 of INTERSPACE). France is now in a position to outmanoeuvre the UK and West Germany both in the provision of satellite capacity for broadcasting and communications and providing regulatory climate for the development of new broadcasting media.

Whilst Britain has been unable to move ahead with its first generation DBS TV system, and has failed to protect itself by registering for new orbital slots for FSS systems, Prime Minister Laurent Fabius, has already announced the initiation of studies on the next generation of TV satellites based on a lighter spacecraft than TDF-1 but compatible with the TDF-1 DBS equipment. It has applied for orbital slots for F-SAT and Videosat. TDF-1 and TDF-2 are now due for launch on 7th July 1986 and February 1988 respectively with each able to provide four TV channels. Whilst there was dispute in 1984 between the French Secretary for Communications (in favour of high power DBS TV technology) and the PTT Ministry (favouring lower power FSS-like systems), Fabius's announcement has helped reconcile the differences. Though the announcement of launch dates was seen as a victory for Eurosatellite and Aerospatiale and the supporters of DBS TV technology. Electronics outfits such as Thomson, Philips and Siemens

saw the decisions on TDF-1/2 as a green light to start the production of DBS receiving equipment for the European market.

Societe de Commercialisation des Satellites de Telediffusion is the French state controlled DBS marketing company being prepared by Jacques Pomonti (President of the Institut National de l'Audiovisuel). It is handling the negotiations with CLT for the lease of the two French DBS transponders to transmit RTL and RTL Plus channels for Europe. The new developments in France place that country in a stronger tactical position over negotiations with Luxembourg, particularly as the Coronet project is still not developing smoothly and negotiations over the DBS repeaters, particularly about price, remain difficult.

Announcement of the French government's interest in regional and local TV was immediately followed by the announcement of new entrant TVE or Teleurop under French Rupert Murdoch-like newspaper proprietor and radio broadcaster, Robert Hersant. Hersant claims that the TVE project has been under consideration for several months and has been prepared "in connection with the deregulation policy of President Francois Mitterand." His daily newspaper, *Le Figaro*, has dutifully announced that "Our media group is becoming an audiovisual communications network. We are immediately creating TVE or Teleurop, a television channel on a European scale."

"Such an enterprise with a European dimension, will be organized with European partners and in connection with an American associate. In France, we will associate other media and industrial groups, interested in diversification into communications, with our project. Of course, we will be ready in 1986 for the privatization of the public audiovisual sector." TVE is described in *Le Figaro* as a national channel transmitting from 6 to 24 hours each day; four hours of local programmes will be inserted between general programmes. *Le Monde* and *Liberation* describe TVE as a pan-European TV channel identical to the US national networks and do not hesitate to speculate on connections with Luxembourg's Coronet projects (see elsewhere in this issue).

Method of transmission of TVE has not been announced. Mitterand's decision to allow local and regional TV stations envisages up to 85 stations throughout France, with initial services from early 1986. Despite Hersant's claim that he will be ready for "privatization of the public audiovisual sector" Mitterand has decided not to privatize any of the state-owned TV channels. Hersant

is no supporter of Mitterand. A right-winger, his press empire has been subject to anti-monopoly moves by Mitterand. New broadcasting policy will also restrict the number of television channels controlled by any one newspaper.

Jean-Denis Bredin (a leading French TV consultant) is due to complete a report by April on the effects of local TV stations on current cable and satellite TV plans. It is believed that the report will have little effect on the policy for local TV. Marc Tessier, new head of Pay-TV outfit Canal Plus has said that he does not fear possible complete deregulation of French TV broadcasting but that private sector local and regional TV will be more of a threat to the TDF-1 project and public sector broadcasters than Canal Plus. Canal Plus now has over 250,000 subscribers and its first year target is 800,000. Other commentators believe that competition from private television channels and DBS TV may force Canal Plus to become a conventional channel supported by advertising and sponsorship. Canal Plus has already experienced problems with supply and technical quality of decoding equipment and piracy. Marketing information indicates that many subscribers are willing to pay for Canal Plus because it is an alternative to the existing state controlled channels. Nearly 50% of existing subscribers have expressed doubt that they are willing to renew their subscriptions. When new alternatives to state broadcasting become available, it is suggested that subscribers may ditch the channel in droves.

Local and regional TV policy also affects the prospects for France's cable television plans where 180,000 homes are expected to become connected in the first quarter of 1985. Under current proposals, France will have six distribution methods for television — existing and new terrestrial networks, low power satellites (Eutelsat and Telecom 1), high power DBS, the Canal Plus system, and cable networks. There are further satellite systems in the pipeline capable of distributing more television channels to the French consumer — Coronet, UK DBS TV system, Intelsat..... Cable policy has been heavily criticised; many local authorities have not yet finalized the commercial terms with the PTT for providing cabling or completed their operational plans. There has been considerable delay in construction of the current systems although it has been claimed that, overall, the plans are only three months behind schedule.

Meanwhile, heads of the Lander governments in West Germany have failed to produce a common media policy. One consequence is that no precise

plan for use of TV-SAT has been agreed. The only major chink in the armour of the current broadcasting establishment has been the SAT-1 channel which began services on 1st January through Eutelsat I-F1, transponder No. 10. ARD is backing the Dutch based Olympus channel headed by NOS, but it is by no means certain that ARD will continue to do so in the light of failure to achieve a national media policy. Bertemann has yet to find capacity for its RTL-Plus channel.

ITS's WORLDWIDE VIDEO CONFERENCING

★ Independent Television services of Belgium is currently pushing hard its "Spacelink" network for worldwide videoconferencing. Organization uses a dedicated transponder on Eutelsat I -F1 (transponder No. 9). Spacelink network consists of a fixed uplink point near Brussels and permanent downlink systems installed in large international hotel and conference centres in 15 European countries. Uplink facilities in Belgium include full studio and production facilities and use the Belgian RTT's earth station at Liedekerke. Receiving points are equipped with fixed satellite down link equipment, large screen projection, public address and return-question equipment. Signals are scrambled for transmission. Spacelink network will be linked by satellite to a transatlantic and US domestic distribution network and also to the Far East. It will also be available directly to corporate premises equipped with spacelink videoconferencing facilities.

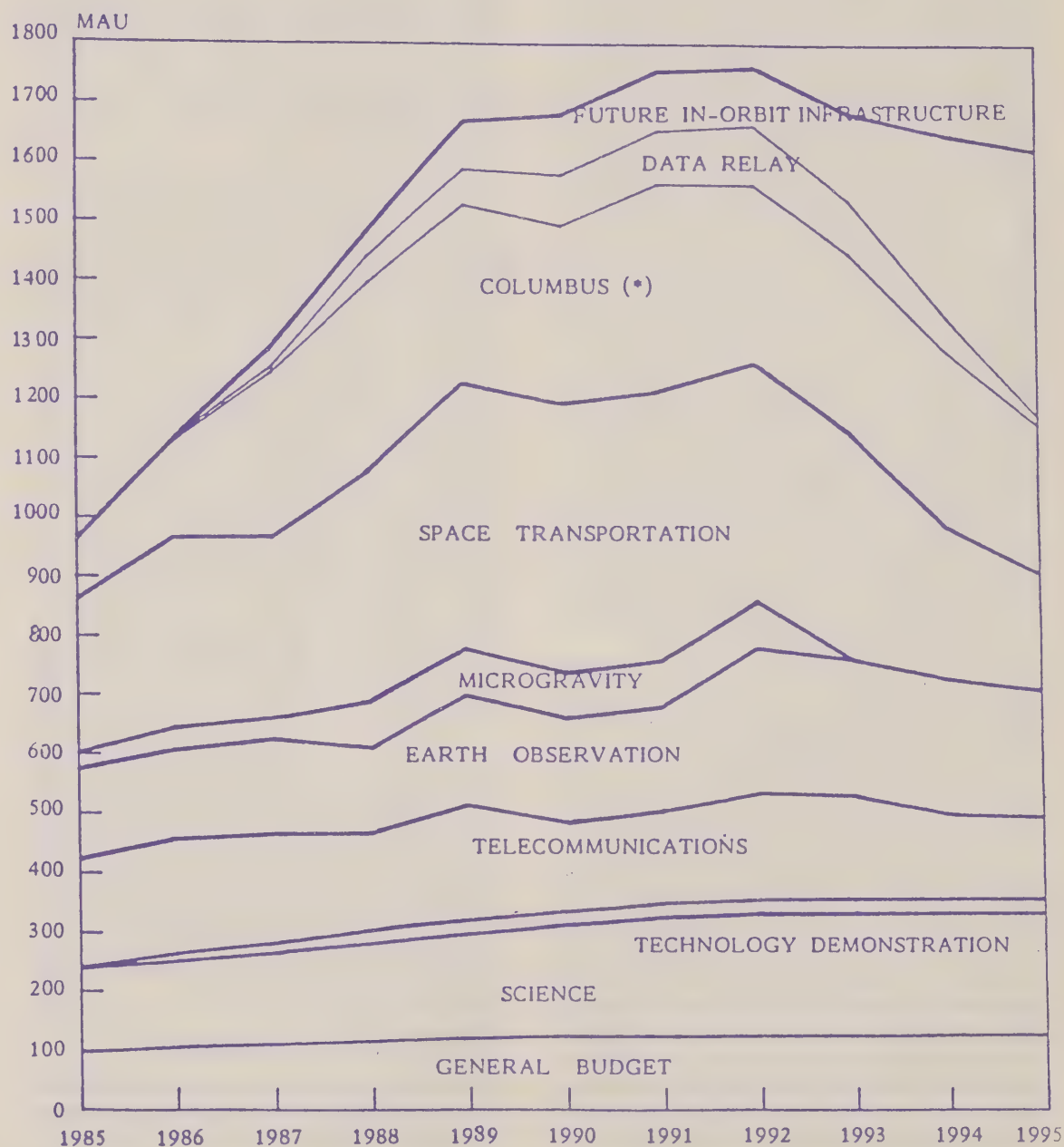
Spacelink is also offering two specific services. The Press Channel, aimed at electronic and printed media allows journalists to take interviews from their own newsroom. It also provides interactive televised press-conferences. The Preview Channel aims to be "Europe's first all-year-round media market" and provides programming for previewing or to the press for reviewing purposes. A menu of scheduled previews is available through the network's teletext system.

Contacts for Spacelink are as follows:

- 1) Belgium — Ignance Vars Parys, Spacelink Belgium, Erzelstraat 1, 8000 Brugge, Belgium. Telephone (32) 50/340212.
- 2) Holland — Joost Van Breukelen, Spacelink The Netherlands, Koninginnegracht 44, 2514 AD Den Haag, Netherlands. Telephone (31) 70/656065.
- 3) France — Gerard Maisan, Spacelink France, 2 rue Camille Desmoulins, 95600 Eaubonne (Paris), France. Telephone (33) 3/9593700.

ESA LONG TERM PLAN 1985-1995

BREAKDOWN OF OVERALL EXPENDITURES PER FIELD OF ACTIVITIES



(*) For all areas, the expenditure profiles include the approved programmes; in particular within "Columbus", expenditure for Spacelab, STS LTPP and Eureka over the period 1985-1988 has been included.

INSURANCE LOG JAM MOVES

★ With high rates and strict conditions on coverage, space insurance underwriters are back in business in a big way following the hiatus of last year.

As reported in INTERSPACE 50, insurers have sought significant increases in launch and life insurance rates to help balance their books following last year's three major losses which resulted in claims of \$300 million.

Apart from business conducted under existing arrangements, the first launch insurance to be placed in the markets has been that for Brazil's SBTS satellites. Coverage for launch by Ariane, positioning in geostationary orbit and satellite commissioning has been placed at a rate of 16.7%.

INTEC, the Washington-based specialist space and telecommunications underwriter, and Munich Re, a major second tier (reinsurance) underwriter, have led a placement covering only 60% of the value originally required by the Brazilians. Many major insurers, including Generali of Italy, have held out for higher rates.

Aussat, who are now planning to launch one satellite on the Space Shuttle and two on Ariane and not wishing to self insure like the Brazilians, have finally agreed to pay 20% for their Ariane launches and 16% for their Shuttle launch.

Arabsat have also approached the market along the same lines for their upcoming launches, one on Ariane and one on the Shuttle.

Insurer's reluctance to underwrite two or more satellites on the same launch has been instrumental in separating GTE's GStar and Spacenet satellites which were originally scheduled to go up on the same Ariane launch later this year.

Higher life insurance rates covering satellite operations have also gained acceptance by both buyers and underwriters. Business has been placed at rates of about 3% on a number of programmes recently.

If there are no major losses this year, there is a good chance that underwriters as a group will be able to balance their books in this class of business by year's end. This will depend on potential buyers paying substantially higher rates than were prevailing a year ago before the major losses, although a clean loss record over the next few launches may put some downward pressure

on both launch and life rates which are at an all-time high.

INTERSPACE contacted London brokers this week regarding prospects of fall in rates. One leading broker believed that the market would not accept a significant fall in rates within the next two years and that presupposed no major claims. High rates and past losses have resulted in lower levels of launch cover — insurance customers were unwilling to pay high premiums resulting from extensive limits and underwriters unwilling or the market unable to provide cover.

COLINO ARGUES TO U.K. PARLIAMENT AGAINST COMPETITION

★ Speaking to the British Parliamentary Advisory Committee on 22nd January, Intelsat Director General Richard Colino rolled out the arguments against allowing competition to the Intelsat system. New, competitive, intercontinental and trans-oceanic satellite systems will require modification of Article V(d) of the Intelsat Agreement to allow Intelsat to compete. Colino's move has raised interest in the UK. Current contenders to enter the North Atlantic comsat traffic market are all US based, although Spain has been considering a system and France has kept options open.

Colino argued that "It would serve all interests for the United States Government, at the earliest opportunity possible to meet with other Parties (Governments) to the INTELSAT Agreement to explain fully its bases for this new concept and policy; the implications for INTELSAT and, most importantly, its member nations and telecommunications entities; and, what steps the United States intends to take and other guarantees it may offer, if any, to ensure the future viability of the INTELSAT system and the avoidance of unfair and undue economic harm to any INTELSAT member nation or user."

Colino said that the appropriate forum such a meeting would be the Assembly of Parties, the principal organ of INTELSAT. "Undoubtedly, some of these issues will be discussed at an Extraordinary Meeting of the Assembly of Parties on 29-31 January in Washington, D.C. I would hope that any actions of the Assembly will be reflected in conclusions reached by the FCC. The results of the deliberation will have a profound effect on international relations for years to come, and will help define the structure of the global society for years to come", he said.

ABCI SUFFERING FROM LACK OF FINANCIAL SUPPORT

★ While Coronet Societe d'Etudes is trying to get financial support from investors in Europe for a satellite communications market which is not overcrowded the Advanced Business Communications Inc. is having problems in finding money to develop its US communications satellite system. ABCI is one of 10 companies licensed by the FCC to construct and operate commercial communications satellites. Capacity on the ABCI satellites is now available for sale or lease to provide communications beginning 1987. The ABCI spacecraft, planned for launch in 1987-1988, are the most powerful communications satellites to be developed by a private company: each ABCI satellite will offer sixteen 50W repeaters in the Ku-band spectrum, for sale or lease in a "shopping center" mode, whereby the buyers or lessors will use them for their own communications networks or will be common carriers. Developed by Hughes Aircraft, the ABCI spacecraft are based on the HS-393 platform, also used for the big Intelsat VI satellites. Weighing 1,350kg in geostationary orbit, spin-stabilized for orbital locations at 83° and 130° West, they will be launched by the Space Shuttle (with integrated propulsion systems) or by Ariane 44L.

WILL GIOTTO BE READY FOR LAUNCH IN JULY?

★ While the Russian VEGA probes are currently on the way to Venus and, hopefully, to Halley's Comet, the ESA scientific community is preparing the Giotto spacecraft. British Aerospace Dynamics is the prime contractor for the first European interplanetary probe. The flight model of this spin-stabilized spacecraft, designed to encounter the Halley Comet within a distance of 500km (target goal), has completed acoustic, vibration, solar simulation and thermal vacuum tests at the CNES/Intespace facilities, Toulouse (France). While most of the hardware for the flight model is already qualified and available, some serious delays concern the development of the most spectacular equipment onboard Giotto: the camera developed by the Max Planck Institute of Lindau (Germany) will hopefully be tested in February and qualified in March. This instrument, using CCD technology, is complex; it must provide close and detailed pictures of the cometary nucleus, while Giotto is passing at the encounter speed of some 68km per second. Pictures transmitted by Giotto at high

data levels will be taken from about 30,000km to about 1,000km and must show details of 50m in the nucleus.....

The development of the Giotto camera is a serious unknown in the preparation of the Giotto probe. Delays are considered to be so serious that it is being speculated how to delay the Giotto launch from July to September..... The Science Board of ESA is investigating the launch opportunity in September. An Ariane 2 launch vehicle will be required to send Giotto in a direct ascent trajectory, with the solid MAGE-1SB motor as 4th stage utilization, to the Halley Comet. ESA and Ariane-space will have to discuss the delayed launch of Giotto, if this opportunity becomes necessary.

(EDITORIAL NOTE:- As we closed for press, British Aerospace advised that a delay in launch had not been decided on.)

OTHER NEWS

★ Asia's Largest optical telescope, designed and developed by the Bangalore-based Indian Institute of Astrophysics is nearing completion at Kavalur observatory in the South Indian state of Tamil Nadu. According to Institute Director, Dr. J. C. Bhattacharya, the telescope will see its first star in April 1985. Dr. Bhattacharya said the telescope incorporating up to 80% indigenously devised optic and electronic systems would be used to study selected spots in the sky from where strong fluxes or radiation like radiowaves or x-rays were emitted and from where no adequate optical information was available as yet. It would also be used to map the spiral arms of the milky way.

★ Indian built scientific probe "Anuradha" to be flown as part of the multinational Spacelab by means of Space Shuttle on April 30, 1985 would help carry out experiments, first of its kind, on the low energy cosmic ray hitherto unknown to scientists. This will be the only experiment to be carried out from Asia by the Spacelab. According to the principal investigator of "Anuradha" Prof. S. Biswas, "this would provide new clues on certain types of stars which generate cosmic rays. The experiment may in effect cast a new light on the evolution of life on the earth." Prof. Biswas says that "the new cosmic ray detector of Anuradha is 100 times more sensitive than the best previously used. As the cosmic ray particles pass through the detector, their identity, charge, energy and abundance will be measured."

SHORT NEWS

★ Selenia Spazio has placed a contract worth £110,000 with Ferranti Professional Components for the supply of C and J band microstrip drop-in insulators for the Olympus spacecraft's attitude reference receiver. The latter is being manufactured by HSA Hengelo of Holland.

★ European PTT Club, CEPT, is considering a European standard for encryption of satellite TV channels.

★ US Senator Jack Garn (Republican, Utah) will fly on Shuttle mission 51-E (launch, 20th February 1985) as a payload specialist. Mission will deploy TDRSS-2 and Telesat 1.

★ Belgian state controlled broadcaster RTBF is continuing preparation of a Pay-TV channel similar in concept to the French Canal Plus channel. RTBF is still looking for financial support and agreements for film distribution rights. Current plans envisage start of operations of the channel by the end of 1985. Objective is to acquire some 220,000 subscribers, each paying around £10 (\$12) per month for which the consumer will receive around 10 new and recent films per month. Possible name of the channel is Cine Premiere.

★ Memorandum of Understanding on space collaboration between China and the UK was signed on 28th January. Move is intended to "enable regular exchanges of space scientists to take place, as well as paving the way for cooperation in the latest satellite technology developments." Chinese signatory to the Memorandum of Understanding, Li Xue (first deputy Minister of Astronauts) followed up agreement with a visit to BAeDG and Marconi Space Systems where opportunities for future cooperation (were) discussed."

★ Bavaria will become the first regional state of West Germany to use one of the six half-transponders leased on Intelsat V (Indian Ocean) this summer when a yet to be named private commercial TV channel begins broadcasting over Germany

★ In response to questioning on HOTOL, UK Minister Geoffrey Pattie has confirmed that this project is not on the formal agenda of the ESA Council of Ministers meeting this week but that ESA partners should be made aware of its progress. He states that there is "no secret" about the programme and BAe and Rolls Royce are involved in a 2 year study. It is an "extremely interesting" project which "merits further study." British Aerospace have also confirmed that their "Big Communicator" satellite studies are not on the ESA agenda and that they currently remain internal efforts of the company. UK consensus, is that involvement in the space station will require an independent European Data Relay satellite system.

★ Arianespace visit to the UK All-Party Parliamentary Committee on Space this week is a preliminary visit prior to a full presentation due in April and May. It is not clear at this stage why Arianespace is making these visits. Arianespace is backing CNES's Ariane 5 Poudre Concept and it is common knowledge that members of the Parliamentary Committee and relevant government ministers have been well informed about doubts on the commercial and technical aspect of Ariane 5 Poudre.

★ The Japanese Prime Minister, Mr. Yasuhiro Nakasone has come under severe attack from Japan's opposition parties for his support to President Reagan's space war efforts. Japan's leading opposition party JSP has charged that Mr. Nakasone's support to President Reagan's bid to take his confrontation with the Soviet Union to space was a dangerous commitment which will lead to nuclear war and "increase tension in Asia and Pacific region."

★ The Indian Space Department has initiated the process for selecting the second Indian astronaut who will soar into space onboard the American Space Shuttle in 1986. The first Indian cosmonaut Sq. Ldr. Rakesh Sharma who went into space onboard the Soviet Soyuz-T-11 spaceship carried out a number of experiments in biomedicine, remote sensing and space manufacturing.

The Shuttle carrying Indian cosmonaut would also launch India's three-in-one domestic spacecraft INSAT-1C. According to Prof. U. R. Rao, Chairman, Space Commission, India had begun working out final details with NASA on the scientific experiments to be conducted onboard the Shuttle during its flight.

- ★ India and five other nations, meeting in New Delhi on January 28 to discuss the problems of nuclear weapons and disarmament are expected to pay particular attention to new treats from reported plans of US and its allies to deploy weapons in outer space.
- ★ British Space Professionals formally merged with the Space Society on 1st February; new society is called British Space Society.
- ★ Laben of Milan has ordered four spacebourne digital magnetic tape recorders from Odetics Inc of the USA. Recorders are to be incorporated into on-board data handling equipment manufactured by Laben for the ERS-1 remote sensing satellite.
- ★ Lord Boston, Chairman of UK broadcasting company TVS, has told his shareholders that although the company believed DBS could make an important contribution to the future of television. However its long-term success might be achieved by an "alternative approach."
- ★ British Telecom is seeking customers for the transponders allocated to the UK on Eutelsat I-F3. Deadline is September and amongst the runners is believed to be Visnews.
- ★ Two Day Conference on Television by Satellite — The Practical, Legal and Financial Implications, is to be held in London starting 26th February. Subjects include intercontinental TV transmissions, advertising and satellite contracts. Details from European Study Conference, Kirby House, 31 High Street East, Uppingham, Rutland, Leicestershire. LE15 9PY. Telephone 0572-822711.
- ★ American Satellite Corp has leased transponders on Westar V to Citicorp Multi Leasing. Contract is worth \$35 million.

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